DOCUMENT RESUME

ED 394 002 CE 071 304

AUTHOR Crawford, David L.; And Others
TITLE Schools and Labor Market Outcomes. EQW Working Papers WP33.
INSTITUTION National Center on the Educational Quality of the Workforce, Philadelphia, PA.
SPONS AGENCY Office of Educational Research and Improvement (ED), Washington, DC.
PUB DATE 95
CONTRACT R117Q00011-91
NOTE 38p.
PUB TYPE Reports - Research/Technical (143)

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS Academic Achievement; Curriculum; Educational Needs; Educational Policy; *Education Work Relationship; *Employment Patterns; High Schools; *Institutional Characteristics; Labor Market; Literature Reviews; Longitudinal Studies; *Noncollege Bound Students; Outcomes of Education; *Predictor Variables; Regression (Statistics); *Salary Wage Differentials; Student Characteristics
IDENTIFIERS High School and Beyond (NCES)

ABSTRACT

The relationship between school characteristics and labor market outcomes was examined through a literature review and an econometric analysis of the effects of various characteristics of the schooling experience on students' labor market performance after high school. Data from the National Center on Education Statistics' longitudinal survey of students (High School and Beyond 1980), were subjected to a number of regressions using two different models. It was discovered that schools make a difference in the labor market performance of those graduates who enter the labor market directly after high school. Some particular characteristics were identified as affecting earnings; however, the aggregation of the school characteristics assembled did not decisively explain differences in the job market performance. Attending a school where up-to-date local job listings were available and information on finding a job was provided, higher family income, higher school test scores, and participation in academic education were all linked with higher postschool earnings, whereas per-pupil expenditure, class size, teacher salaries, and teacher experience were not. (Appended are the following: summary of relevant studies; sources/definitions of variables; means and standard deviations for variables used in the regressions; and the two models.) (MN)

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ED 394 002

Schools and Labor Market Outcomes

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CE071 304

The authors thank Shuping Zhang, computer programmer at the Institute for Research on Higher Education, for his superb computer assistance.

"Schools and Labor Market Outcomes" by David Crawford, Amy Johnson, and Anita Summers
EQW Catalog Number: WP33

The work reported herein was supported under the Education Research and Development Center program, agreement number R117Q00011-91, CFDA 84.117Q, as administered by the Office of Educational Research and Improvement, U.S. Department of Education. The findings and opinions expressed in this report do not reflect the position or policies of the Office of Educational Research and Improvement or the U.S. Department of Education.

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Introduction

Two recurrent themes have pervaded the public opinion of education in the United States over the last 10 to 15 years: dissatisfaction with the quality of our primary and secondary educational performance and dissatisfaction with America's competitive position in global markets. These two themes became tied to each other with the theory that our relatively inadequate investment in human capital has resulted in a relatively inefficient labor force—and that it is the relatively low productivity of labor inputs in the United States that has caused us to fare poorly in global markets. In fact, there is no decisive evidence on this causal relationship.

This paper reports on the already existing evidence, and on the results of our own econometric analysis, of one aspect of the hypothesized relationship: *the effects of various characteristics of the schooling experience (real measurements of human capital investment) on the labor market performance of those schooled.* Do differences in schooling produce differences in labor productivity that are reflected in wage differentials? In particular, we are interested in the school characteristics and job success of the students who enter the labor force directly from high school.

Policy Significance

The linkage between what high schools do and what their students do upon completion is fundamental to a number of current issues at the forefront of many of the nation's policy debates—the use of incentives to improve educational outcomes, the allocation of scarce budget dollars between education and welfare, and the role of education in accelerating the nation's productivity growth.

Incentives To Improve Educational Outcomes[1]

Considerable educational resources are allocated toward the general objective of helping students to connect with and perform in jobs. In fact, we do not know whether this allocation is rational. Empirical evidence from the production function literature points to a number of connections between the measurable characteristics of the learning process in schools and student achievement. These connections, however, can best be characterized as decisively unidentifiable. We know that certain teachers and certain schools produce consistently better results (after controlling for other characteristics of the students and their environment), but the evidence on the specific qualities of teachers and schools that account for higher-than-predictable performance is not consistent.

The prevailing policy consensus among those doing research in this area is that stellar teachers and stellar schools clearly exist—and that these schools and teachers, somehow, are doing things right. Perhaps then, rather than trying to structure specific techniques for a good education, those teachers and schools that are succeeding, however they are doing it, should be rewarded in the same way that most professionals in other fields are. It is certainly reasonable to suggest that in teaching, as in other occupations, higher rewards for merit might produce more meritorious performances.

It is possible, though, that direct links do exist between the measurable characteristics of the learning process and success in the labor market, even though they do not appear to exist when success is measured by achievement tests. Certainly, the extensive discus-

sions of curriculum content, performance measures, disciplinary requirements, and counseling methods are based, in part, on the notion that there are methods schools can use to enhance their students' future employment patterns. If these direct links exist, we need to identify them and to direct resources toward them so that labor force participation rates and job performance for those going directly to jobs from high school are increased.

Dollars for Education Versus Family

Even if direct links between school programs and the labor market experiences of their graduates are not identifiable, it may still be true that schools make a significant difference—but, as appears to be the case with achievement outcomes, not in a uniform way. Or, it may be that the home environment dominates the results. How our government allocates its educational dollars, and how it allocates resources between improving family environments and education, should be influenced by the findings.

Although the relationship between years of schooling and subsequent earnings is identifiable, the measures are blunt. We do not know whether there is a substantive connection or only a credentialing connection. If you learn four more years of math, what does it add to your marginal product for employers and to your wages? If you have two years of vocational education in an area in which you are subsequently employed, do you receive higher wages than the person who had the same number of years of education, but no vocational education? If you are in smaller classes, do you have a learning climate that nurtures you in a way that makes your worth to employers greater than someone with the same school and family characteristics who was educated in larger classes?

We need to know whether there are identifiable forms of restructuring schooling that will change labor market returns, or whether it is the family environment and/or a combination of non-identifiable factors that account for larger earnings. It is possible that some schools and some teachers excel in providing the motivation and skills for good job performance; but, as is the case in affecting cognitive achievement, there may be any number of ways of providing the stimulus. If there are identifiable characteristics, we would want to have policies that direct resources to them. If they are not identifiable, but schools do produce different labor market outcomes, we would want to focus policy on directing resources to provide incentives for teachers and schools to motivate students for labor market performance—leaving it to the teachers and principals to figure out how to do so. Such a result would provide strong support for increased schooling autonomy. If the home environment were the only significant factor determining the outcome, then schools would not be the arena on which to focus to improve job performance.

Education and Labor Productivity

The empirical evidence on the connections between national measures of productivity changes and educational attainment does not match the national rhetoric on the subject. Former Vice President Quayle's National Council on Competitiveness focused, almost exclusively, on the role of education in changing America's competitive position *vis-à-vis* the rest of the world. Yet, John W. Kendrick (1977) and, more recently, Jong-Il Kim and Laurence J. Lau (1992), using more elegant econometric techniques, converge on the general conclusion that educational attainment explains only about 10 percent of the changes in productivity in the United States. Only limited information is gained

from these studies on the role of schools because the investigators use the very blunt measure of years of schooling as the education measure, not quality indicators. Eric A. Hanushek and colleagues, in a recently completed study, have reviewed the evidence. They conclude that current research does not provide a clear consensus on the causes of productivity changes in the United States, that the students in the lower test-score cohorts were barely in the labor force when productivity growth was lowest, but that employers are increasingly dissatisfied (1994).

The ability and capacity of America's elementary and secondary schools to deliver entrants into the labor market who have the skills employers want to reward is important to assess so that individual and aggregate national productivity can be enhanced. If resources are to be allocated efficiently within education budgets, and between education and welfare budgets, and if education is to contribute even marginally to the nation's productivity growth, it is essential to identify the link between what schools do and how their students perform in the labor market.

Review of the Literature on School Characteristics and Labor Market Performance

A search of the empirical literature identified over 200 studies that linked school characteristics and labor market performance (Johnson and Summers 1993). Only 17 of these studies met the following criteria:

1. The labor market characteristics of students after they left high school were used as output measures.
2. Quality measures of schools were identified as input measures.
3. Reasonably sophisticated statistical procedures were used, such as multiple regression analysis, large sample size, and a range of control measures.
4. The studies used "hard" measures of labor market outcomes, such as annual earnings, weekly earnings, hourly earnings, number of weeks per year employed, number of months per year unemployed, return to education, and the Duncan Index of Occupational Status (Duncan 1961).
5. The studies reported on labor market measures after graduation and not just on job characteristics of students while still in school.

Appendix A presents, for these 17 studies, a table that provides succinct summaries of the level of

aggregation of the data, the dating of those data, the characteristics of the sample studies, the nature of the school input measures used, the characteristics of the measurements of the pupil, the peer input variables used, the labor market output measures examined, and the input measures with coefficients that had statistically significant results.

Table I presents a simple, but revealing, summary of the links between all of the inputs in the 17 studies and a number of labor market outputs: annual earnings, weekly earnings, hourly earnings, number of weeks or months unemployed, return to education, and occupational attainment. The large number of inputs were grouped into seven categories: students' academic experiences, students' family backgrounds, students' labor market characteristics, students' other characteristics, peer characteristics, geographic indicators, and school characteristics. In Table I the general and specific input categories are listed in the first column. The number of studies that had findings in each of the general categories is also listed in the first column. There are many more findings than studies because, in many cases, several measures of the inputs and outputs were used in one study. All of the relevant findings are reported in the table. The number of coefficients that are positive and statistically significant for each input are in the second column, the numbers that are statistically significant and negative are in the third column, and the total number of statistically significant findings for each input are in the last column.

(See next page.)

Table I
SUMMARY OF EMPIRICAL FINDINGS IN 17 STUDIES OF SCHOOLING-RELATED INPUTS AND LABOR MARKET OUTPUTS

	# of Statistically Significant Findings			# of Nonsignificant Findings	Total # of Findings
	+	-	Total		
Students' Academic Experience (11 studies)					
High school degree	0	0	0	3	3
Hours of studying	1	1	2	3	5
Test scores/rank	7	1	8	14	22
Type and quantity of vocational coursework	16	2	18	32	50
Type and quantity of academic coursework	2	3	5	11	16
Years of education	4	0	4	5	9
Total	30	7	37	68	105
Students' Family Backgrounds (7 studies)					
Family income/possessions	3	0	3	6	9
General socioeconomic status	0	0	0	9	9
Parental education and occupation	0	0	0	14	14
Number of siblings	0	0	0	8	8
Race	0	0	0	8	8
Total	3	0	3	45	48
Students' Labor Market Characteristics (4 studies)					
Worked during high school	6	1	7	3	10
Part-time student	0	0	0	3	3
Occupational information/aspirations	2	0	2	1	3
Total	8	1	9	7	16
Students' Other Characteristics (6 studies)					
Ability	3	0	3	7	10
Self-scoring results	0	0	0	18	18
Miscellaneous other	0	0	0	17	17
Total	3	0	3	42	45

Table I (cont'd)
SUMMARY OF EMPIRICAL FINDINGS IN 17 STUDIES OF SCHOOLING-RELATED INPUTS AND LABOR MARKET OUTPUTS

	# of Statistically Significant Findings			# of Nonsignificant Findings	Total # of Findings
	+	-	Total		
Peer Characteristics (3 studies)	1	0	1	6	7
Geographic Indicators (4 studies)					
Central states	3	1	4	14	18
Northeast	1	1	2	2	4
Mountain	0	0	0	3	3
Pacific coast	1	1	2	2	4
South	2	2	4	5	9
Rural	1	1	2	4	6
Suburban	1	0	1	3	4
Urban	1	0	1	3	4
Total	10	6	16	36	52
School Characteristics (11 studies)					
Length of year/term	1	0	1	1	2
Teacher/pupil contact	2	1	3	2	5
Quality of teachers	2	0	2	1	3
School size	2	0	2	0	2
District/state ADA* $ or Teacher Salaries	9	0	9	0	9
Other characteristics	1	1	2	15	17
Total	17	2	19	19	38

*ADA: Average Daily Attendance

What do we know about schooling and labor market performance from these 311 findings?

The combined wisdom of these studies is that, for most categories of the inputs identified as relevant to future job performance, there were far more nonsignificant results than significant ones, and the story was frequently mixed between positive and negative results among the statistically significant ones. Some findings are suggestive, however: (1) The type and quantity of vocational education, among the statistically significant findings, stand out as having the largest number of positive results. There were, however, more nonsignificant results than significant ones. (2) On the other hand, the type and quantity of academic programs do not appear to have any consistent impact on the labor market performance of those who enter the labor market directly after high school. (3) Acquiring knowledge about working during the high school years—through direct job experience or other sources of information—appears to be helpful for future job performance. (4) There is some suggestion that larger schools provide a better preparation for the job market, but this theory was barely studied in the research. (5) There is a strong suggestion that better teachers do a better job of preparing students for the world of work. Education and salary measurements appear to support this. (6) One study examined the effects of schools on annual earnings 12 years after high school graduation, using dummy variables for individual schools, and concluded that over 15 percent of the variance in earnings is accounted for by secondary school differences. This study, using careful statistical techniques, indicates that differences among schools, not identifiable by individual characteristics, matter. (7) The collected results of the studies examined indicate that socioeconomic status (SES) characteristics do not dominate the job outcomes.

Tallying results is useful to get some notion of what has been done, but it is hardly a sophisticated way of determining what are the real relationships. Output measures differ, input measures are on different scales, magnitudes of effects are not easily combined, and the same data were used in several studies, perhaps leading to double-counted results. A longitudinal study that can (1) track the links between school characteristics and the job market performance of the students who do not go on to higher education, (2) control for the spectrum of SES, school, and peer group characteristics, and (3) explore the possible endogeneity between pupil performance input measures and other pupil and school characteristics would come closer to providing appropriate policy guidance on schools and labor markets. Such a study is the subject of this paper.

The Model

The specific questions of interest are: (1) can schools make a difference in the labor market performance of the students who go directly into jobs; and, (2) if so, can the characteristics of schools that make a difference be identified?

Two basic models matching these questions have been explored. The dependent variable on which we focus is the annual earnings of each student in the sample five years after the high school sophomore year (or three years after graduation for those who graduated on time). The independent variables are grouped into eight categories, each hypothesized to influence labor market performance. Four of the categories are descriptive of and specific to the pupil, three describe the school the pupil attends, and one is descriptive of the labor market area.

Pupil-specific variables:

- Measurements of the pupil's socioeconomic characteristics (PSES)
- Measurements of the pupil's performance (PPERF)
- Descriptors of the pupil's curriculum (PCURR)
- Descriptors of the pupil's participation in extracurricular activities (PEXT)

School-wide variables:

- Characteristics of the school's staff (SSTAF)
- Characteristics of the school's instructional program (SINST)
- Characteristics of the school's student body (SCHSTU)

Labor market variable:

- Local unemployment rate for those who do not have education beyond high school (UN)

Standard linear specifications were used and are reported below. There is a potential problem with the use of the standard linear regression model in this context because a substantial number of individuals have no earnings. Tobit models were explored as an alternative specification. Although there were some differences in results, none would translate into different policy recommendations. Details are presented in the section on results. To examine the question of whether or not the aggregate of school characteristics

affects the earnings of students three years after their senior year, a variety of pupil characteristics and dummy variables for each school were combined in this model (Model I):

Model I

$$1.\ EARN85_i = a + \beta_1 PSES_i + \beta_2 PPERF_i + \beta_3 PCURR_i + \beta_4 PEXT_i + \sum_{k=2}^{n} \partial^k SCH_{ik} + u_i,$$

where

- $EARN85_i$ is the earnings of pupil i in 1985;
- $PSES_i$, $PPERF_i$, $PCURR_i$, and $PEXT_i$ are the vectors of pupil-specific variables described above;
- SCH_{ik} is the dummy variable for whether or not pupil i attends school k, where the school identifiers range from 1 to n, and n-1 school dummies are entered; and
- u_i is the disturbance term.

A second model (Model II) examined the effects of specific measures of school-wide characteristics, rather than school dummies, on earnings:

Model II

$$2.\ EARN85_i = a + \beta_1 PSES_i + \beta_2 PPERF_i + \beta_3 PCURR_i + \beta_4 PEXT_i + \bar{\partial}_1 SSTAF^k_i + \bar{\partial}_2 SINST^k_i + \bar{\partial}_3 SCHSTU^k_i + \partial UN^c_i + u_i,$$

where all the variables beginning with a P are the vectors of pupil-specific variables described above, all the variables beginning with an S are the vectors of the school-wide variables described above, and UN^c_i is the unemployment rate in the pupil's county in 1980, the year in which the pupil was a high school sophomore.

The Data

The data source for this study is the National Center on Education Statistics' longitudinal survey of students in the United States, *High School and Beyond, 1980.* The study, conducted by the National Opinion Research Center, focuses on two cohorts of students—all persons in the United States who were high school sophomores in 1980, and all persons in the United States who were high school seniors in 1980.

The longitudinal study collects data from a variety of sources, at different points in time. The following files were used.

Student Files

Surveys administered to students in the spring of 1980 provide data for the Base Year *Student file*, and include information on students' high school program, extracurricular activities, educational expectations and aspirations, and a variety of personal and demographic characteristics. Follow-up surveys of the students were then conducted in 1982 (First Follow-Up), in 1984 (Second Follow-Up), and in 1986 (Third Follow-Up). As the students get older, questions in the later follow-ups turn to issues of unemployment, job history, education and other training, income, and family information.

School Files

In both the base year (1980) and first follow-up year (1982), surveys were administered to school principals and headmasters or their designates. These constitute the *School files*, and contain information on institutional characteristics such as graduation requirements, personnel control, demographic characteristics, programs offered, and per-pupil expenditures.

Administrative and Teacher Files

A supplementary survey, the *Administrator and Teacher Survey*, was conducted in 1984 in approximately half of the schools originally sampled. Separate questionnaires were administered to principals and headmasters or their designates, to teachers, to vocational education coordinators, and to heads of

guidance counseling. Included is information such as staff goals and attitudes, work loads of teachers, pedagogic practices, hiring practices, special programs, linkages to local employers, and availability and use of various services.

Local Labor Market Indicators File

This file contains economic and labor market data for the geographical area of each school in the sample, given both by county and by Standard Metropolitan Statistical Area (SMSA), for the years 1980 through 1982. (The years for which data are available differ by variable.) Economic variables in the file are derived from data provided by the Bureau of Economic Analysis and include such information as the unemployment rate, rate of employment growth, and per-capita income. Analysis of U.S. Census employment data and Student File data by Steven G. Rivkin (1993) produced unemployment rates at the county level and for labor force participants with only 12 years of education.

Transcript File

In the fall of 1982, high school transcripts were collected for a sample of the 1980 sophomore cohort. The *Transcript files* contain records for each secondary-level course taken and information such as absences and suspensions, grades, credits earned, special programs, class rank, and overall grade point average (GPA).

Number of Observations

The focus of this analysis is a better understanding of the extent to which high school characteristics affect the labor market outcomes of students. Because more data were available for the sophomore cohort than for the senior cohort—specifically, information on the two years these students were in high school (sophomore and senior years)—observations are confined to only the students who were high school sophomores in 1980. Several constraints further pared down the number of observations:

1. Because the Third Follow-Up, conducted in 1986, currently contains the most recent information available on labor market experiences, our observations were confined to those students who had records from the Base Year through all three follow-up surveys.
2. Students who reported 1985 income in the top 1 percent of the distribution were eliminated from the sample. These outlier data were inconsistent with the data on hourly wage rates and hours, and appeared to be a population that had incorrectly responded to the income question.
3. Because of the richness of the data provided in the Administrator and Teacher file, all students used in the analysis attended schools for which there were responses to the Principal survey, Teacher survey, *and* Guidance coordinator survey (all of which are components of the Administrator and Teacher file).
4. Only those students who were not full-time post-secondary students were selected. These are students who, in the Third Follow-Up, indicated that they were either not attending a post-secondary school at all or that they were not attending a post-secondary school full-time in 1985, which is the year for which the dependent variable—annual income—is collected.[2]
5. Schools, and their students, that had only one student sampled were eliminated from the observations for Model I.
6. The 49 students for whom race was not identified were eliminated from the observations.

The number of student observations was, therefore, narrowed from the initial sample:

- The initial 1980 sample involved approximately 30,000 sophomores.
- The third follow-up sample in 1986 involved only 14,825 of the original sample.

- *Only half of the initial set of schools was included* in the 1986 Administrator and Teacher survey, reducing the sample to 7,170.
- Only 5,100 of these were also in the Principal, Teacher, and Guidance surveys.
- Excluding students who were in post-secondary education full-time in 1985 reduced the sample to 3,122.
- Excluding schools with only one student reduced the sample to 3,103.
- Excluding students whose race code was missing reduced the sample to 3,055.
- Excluding students who attended one school where the principal's annual salary was less than $1,000 reduced the sample to 3,043.

No effort was made to estimate missing observations. Each variable had some missing observations, and, of course, the students or schools for which they were missing differed in each case. The result is that the Model I specifications were run with about 1,800 to 1,900 observations, and the Model II specifications (with school-specific variables) were run with about 1,000 observations. A complete description of the sources, definitions, and coding of all the variables used is in Appendix B. The means and standard deviations of the variables in the equation using the maximum number of variables are listed in Appendix C.

The Results

To examine the effects of schools on labor market outcomes, a number of regressions were run using Model I, in which school dummies represented all school-wide characteristics, and Model II, in which a number of school-wide characteristics were specified. Since many schools had missing observations for a number of school-wide variables, the number of observations was, of course, smaller for Model II than for Model I. There was a convergence between the strongest specifications of the two models, but the real interest in Model I is to determine whether the aggregate of the school dummies is significant—whether differences across schools play a significant role in explaining differences in the wage differentials of their graduates who go directly into the labor market.

Table II presents the F-test results for the sum of the school dummies in Model I and Table III the regression results for Model II. In both tables, two sets of regressions are presented. The first columns in both tables have results that include a labor market measure (HUNEMP) and the number of hours worked while in school (WKHRS). Diagnostics revealed multicollinearity between these two variables.[3] In order to consider the separate effects, the second set of columns removes WKHRS from the regression. Achievement measures clearly are endogenous to a variety of the SES and school programmatic measures in the regressions. However, the three available measures of achievement—whether or not the student graduated on time (GRADOT), the student's high school grade point average (HSGPA), and a senior year cognitive test score (FUTEST)—all show significant effects on earnings and do not affect the other regression results. (These are shown in Appendices D and E.)

Tobit Specifications

There is a known problem with the use of the standard linear regression model in predicting individual earnings. The general problem is that an assumption of linear functions implies that the marginal impact of each exogenous variable is independent of where it is evaluated—but, in fact, the marginal impact may

depend on the values. The specific problem in our investigation is that a substantial number of individuals have no earnings (20 percent). These properties violate basic assumptions of the regression model. Tobin's limited dependent variable model, also called the censored regression model, provides a more appropriate specification (Tobin 1958).

Using a tobit model, regressions were calculated for Model IIA and IIB (Table III) and for Models IIC, IID, and IIE (Appendix E). Mean values of the exogenous variables were used to compute estimated marginal impact.[4] The differences between the results of the standard linear regression models and the tobit models are noted under each section describing input results. On the whole, the inferences that one draws from the tobit estimates are very similar to those one would draw from the misspecified linear regression models. Because of the similarity of results and the relative ease of interpreting the linear models, the linear model results are the ones we present in detail.

Table II

MODEL I: SIGNIFICANCE OF AGGREGATE OF SCHOOL CHARACTERISTICS ON EARNINGS THREE YEARS AFTER BEING A HIGH SCHOOL SENIOR

	Model IA *	Model IB **
N	1976	1976
Model F-test	2.25	2.14
Probability	0.1000	0.1000
Adjusted R-squared	0.17	0.16
F-test of school du	1.29	1.34
Probability	0.1200	0.2000

* Results include a labor market measure (HUNEMP) and the number of hours worked while in school (WKHRS).

** Results exclude the number of hours worked while in school (WKHRS).

Table III

Model II: EFFECTS OF PUPIL CHARACTERISTICS, PUPIL CURRICULUM, SCHOOL CHARACTERISTICS, AND UNEMPLOYMENT RATES ON EARNINGS THREE YEARS AFTER BEING A HIGH SCHOOL SENIOR

			Model IIA			Model IIB		
Variable	*Name*	*Category*	*Coefficient*	*t-stat*		*Coefficient*	*t-stat*	
Attended kindergarten	KINDGTN	PCURR	327.48	0.56		477.41	0.81	
Has vocational prog.	PROGVOC	PCURR	-904.14	-1.96	*	-1008.00	-2.17	**
No. of in-school extracurricular	INSCHACT	PEXT	77.16	0.72		42.41	0.40	
No. of out-of-school activities	OUTSCHAC	PEXT	-132.82	-0.33		-65.81	-0.16	
Worked 1-4 hrs/week	WORK1	PEXT	37.20	0.50		NA	NA	
Worked 5-14 hrs/week	WORK2	PEXT	543.17	0.88		NA	NA	
Worked 15-21 hrs/week	WORK3	PEXT	2289.45	3.96	***	NA	NA	
Worked >21 hrs/week	WORK4	PEXT	1993.72	3.65	***	NA	NA	
2- or 3-year postsec. degree	ASSOC2	PPERF	1459.22	1.79	*	1578.25	1.92	*
Know how to find job	FINDJOB	PPERF	831.87	1.69	*	884.31	1.78	*
>5 hrs. homework, Sr.	HW82F	PPERF	293.30	0.67		274.95	0.62	
Presence of children	CHILD	PSES	1596.46	0.96		1549.15	0.93	
Family composition	FAMCOMP	PSES	-294.31	-0.59		-278.39	-0.56	
Family income	FAMINC	PSES	0.20	1.89	*	0.30	2.21	**
Marital status	MARRIED	PSES	-1023.59	-1.84	*	-1013.81	-1.80	*
Family income missing	MFAMINC	PSES	-1522.18	-2.03	**	-1448.66	-1.92	*
Pupil is Asian	SASIAN	PSES	3579.27	1.87	*	3682.29	1.91	*
Sex	SSEX	PSES	3591.32	9.08	***	3730.67	9.51	***
Pupil is White	SWHITE	PSES	2099.44	3.33	***	2664.53	4.28	***
% students in academics	ACPROG12	SCHSTU	-7.52	-0.94		-9.82	-1.23	
% 10th grade dropouts	DROPOUTS	SCHSTU	-32.35	-1.23		-34.18	-1.29	
School size	SCHSIZE	SCHSTU	-0.35	-0.95		-0.29	-0.79	
% Black students	STBLACK	SCHSTU	-10.41	-1.17		-10.41	-1.16	
Average class size	CLASSIZE	SINST	43.18	0.83		45.32	0.86	
Local employers' job listings	LOCALJOB	SINST	756.40	1.61		958.57	2.04	**
Activities offered	SCHACTV	SINST	-30.54	-1.43		-28.72	-1.33	
Off-campus work	SCHPROGC	SINST	308.00	0.48		363.00	0.56	
Private nonreligious school	SCHTYPEO	SINST	495.19	0.26		65.96	0.40	
Private religious school	SCHTYPER	SINST	-1372.08	-1.67	*	-1219.58	-1.48	
Prin. / teacher salary	PSALARY	SSTAF	297.55	1.44		338.97	1.62	
Teacher absent	TABSENT	SSTAF	-69.02	-0.93		-91.69	-1.22	
Teacher dismissed	TDISMISS	SSTAF	138.62	1.22		111.97	0.98	
Teacher salary	TSALARY	SSTAF	0.90	0.59		0.14	0.91	
No. of yrs. teaching	YRSTCHT	SSTAF	107.16	0.70		100.02	0.65	
County unempl. rate	HUNEMP	UN	-89.72	-1.10		-125.87	-1.55	
N				1144			1144	
Model F-test				6.58			6.48	
Probability				0.1000			0.1000	
Adjusted R-squared				0.15			0.13	
F-test of school characteristics				1.19			1.39	
Probability				0.2733			0.1441	

* Statistically significant at the 10% level; ** at the 5% level; *** at the 1% level.

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Schools

The most interesting finding of this study is that schools make a difference in the labor market performance of their graduates who go directly into the labor market. The F-test results in Model I (Table II), in which pupil-specific characteristics are combined with school dummy variables, confirm this finding. The F-test result for the school dummies is F = 1.29 (P > F = .0012) for the first specification and F = 1.34 (P > F = .0002) for the second. We can reject the null hypothesis that schools make no difference; the significant positive and negative coefficients on some of the school dummies are not due to chance. In Model II (Table III), in which pupil-specific characteristics are combined with a number of school-wide variables instead of school dummies, the F-test result for the combined effect of the school characteristics is much weaker (P > F = .27 and .14). This suggests that although we have identified some of the *particular* school characteristics that affect earnings, the *aggregation* of the ones assembled does not decisively explain differences in job market performance.

Pupil's Socioeconomic Characteristics

The relevance of family income to student achievement has probably been the most robust finding of the many education production studies, but it did not show up clearly in the labor market effect studies we reviewed (see Table I). In both models, with school dummies and with specific school characteristics, higher *family incomes* (FAMINC) are associated with significantly higher earnings. Three years after high school, students from families with $10,000 more income have earnings about $250 higher. When family income data were missing, 0 was entered. The variable for measuring the impact of a missing family income is significant, indicating that missing values may have introduced some bias into the results. Students who did not report their family incomes had annual incomes that were, on average, $1,500 lower than the rest of the sample. The *sex* (SSEX) of the student had a big impact. Males had earnings $3,600 or more higher than females, on a base of mean earnings for the whole sample of a little over $8,000. (The tobit estimates had somewhat larger differentials.) As in most studies using achievement as an output measure, the *race* (SWHITE; SASIAN) of the pupil—more correctly, some set of background factors associated with race—has an impact, even after controlling for income. White students have earnings over $2,000 higher than Blacks (tobit estimates are slightly higher and more significant); Asian students have earnings over $3,000 higher. *Family composition* (FAMCOMP)—whether or not the student, while in high school, lives with both a mother/female guardian and a father/male guardian—does not seem to play a role. (The impact of other available measures, such as the education of the parents, were examined. Once race, family income, and sex were controlled for, none of these factors played a significant role.) Those who were *married* while in high school (MARRIED) earned over $1,000 less than those who were not, but having a *child* (CHILD) did not reduce earnings. (Tobit estimates for those who were *married* are larger and more significantly negative—earnings are estimated to be $1,600 less.)

Pupil's Performance

What is the impact of various measures of the student's performance in his or her school years on that person's earnings three years after high school? Including performance variables in the regression results clearly presents a problem since these measures are

associated with other SES variables (such as income) and with curriculum choices (such as vocational program). However, in Appendices D and E, findings are reported for three measures when they are added to Models I and II. Whether or not the student *graduated with his or her cohort on time* (GRADOT) is included. Including that measure in Model II did not affect the results for other variables in any important way but did show that it is a strong predictor of future earnings. Students who did graduate on time earned over $2,000 more than those who did not. Each point higher in a student's *high school grade point average* (HSGPA) added about $800 to annual earnings (over $1,000 using tobit estimates), and each standard deviation higher in the high school senior year *composite cognitive test score* (FUTEST) added about $525 to annual earnings (over $800 using tobit estimates). In Appendix D, the analogous F-test results for Model I are shown.

Whether or not the student did *more than five hours of homework* per week during the senior year (HW82F) is not significant. If the student indicated in 1982 that he or she *knows how to find a job* (FINDJOB), earnings in 1985 were higher by a little over $800. Presumably both family and school have input into this capacity. (In the tobit estimates, this variable lost its marginal significance—the coefficient was smaller, but remained positive.)

Pupil's Curriculum

Whether or not the student *attended kindergarten* (KINDGTN) did not have an impact on earnings. But, if the student had a *vocational program* (PROGVOC), rather than an academic or general program, earnings were lower by over $1,000 a year. (In the tobit estimates, the loss of predicted earnings was somewhat larger and decisively significant.) We cannot be sure, of course, whether this result is due to the different programs or to the differences in unmeasured characteristics of the students. In other specifications, not reported here, a student with an academic program had higher earnings of about $1,000. The impacts of other curriculum measures were explored—participation in a Cooperative Vocational Education Program, the proportion of the total number of courses the student took in high school that were vocational—and no other significant results were found.

Pupil's Extracurricular Activities

The number of in- and out-of-school extracurricular activities (INSCHACT; OUTSCHAC) did not have any association with earnings. But whether or not the *student worked for pay* while attending high school did. When the student had a significant work period, 15 hours or more (WKHRS3 and WKHRS4), the impact was positive, significant, and substantial. Such students had subsequent earnings about $2,000 higher than those who did not. (The tobit estimates had higher predicted earnings.) Undoubtedly, this effect comes from both the job experience the student actually received and from the ability of employers to verify that the student can perform on the job. Students who worked fewer hours did not have the same future benefit.

There is a counteracting effect, however. Students who worked a large number of hours—21 or more (WKHRS4)—had a significantly lower grade point average and a significantly lower probability of graduating on time. Cognitive test scores, interestingly enough, were *increased* by working outside of school.[5]

The ability of students to obtain more hours of after-school employment was significantly affected by local labor market conditions—the higher the unemployment

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rate, the higher the number of students who worked 14 or fewer hours per week, and the fewer the number of *students* who worked 21 or more hours per week.

Characteristics of the Student Body

Neither the proportion of the senior student body in an *academic program* (ACPROG12), nor the *size of the school* (SCHSIZE), nor the *dropout percentage* (DROPOUTS), nor the *proportion of Black students* (STBLACK) had an impact on student earnings.

Instructional Characteristics of the School

Class size (CLASSIZE) had no significant effect on earnings, consistent with the findings in the literature on achievement. Whether or not the school gave *credit for off-campus work or occupational training* (SCHPROGC) did not affect future earnings. This suggests, when combined with the positive impact of working for pay, that it is the ability to cope in a real job search and experience that are the important signals to employers. Three results are of particular interest. First, student earnings in public schools were not significantly different from student earnings in other nonreligious schools (SCHTYPEO). There is, however, a large coefficient, significant at the 10 percent to 15 percent level, suggesting that students who attended private religious schools (SCHTYPER) did worse in the job market in terms of earnings than did those who went to public schools (the missing dummy variable in Table III). (In the tobit estimates, SCHTYPER lost its marginal significance, but the coefficients were about the same size and always negative.) Second, students who went to a school that had *local job listings* (LOCALJOB) did almost $1,000 better in their earnings than students who did not, although the significance level was not strong. Third, schools that offered students a wider range of *school activities* (SCHACTV) did not help their students. Negative coefficients, although not significant, showed up in every specification. Perhaps this diverted them from the development of skills needed for jobs.

There is, of course, considerable interest in the question of the impact of school expenditures on student outcomes. School district per pupil expenditure data were available, but with two problems: the school variations within districts were not picked up, and the data were available for only 745 students out of our sample of 1,055 in Model IIA. School-level per-pupil expenditure data were available, but for only 402 students. Regressions were run with each of these, with variables such as class size and teacher's salary omitted. The results indicated significant positive effects of district expenditures and weak positive effects of school-specific expenditures. We need better data to be able to speak to the question of the effects of expenditures on labor market performance.

Staff Characteristics

Teacher salary (TSALARY: the first step on the salary schedule for a beginning teacher), *teacher absenteeism* (TABSENT), and the *number of years teachers taught* (YRSTCHT) had no discernible impact on the three-year-out earnings of the students. If principals received salaries that were relatively higher than teachers, measured by the *ratio of principal to teacher salaries* (PSALARY), students did better in the job market. The positive coefficients, although not significant at the 10 percent level, showed up in every specification. This finding has bearing on the school-based management debate, suggesting that higher managerial rewards have an impact on student performance. This receives some further support from the

finding that there is some suggestion that students did better in schools where there were more *teacher resignations or retirements* (TDISMISS) for poor teaching.

Labor Market

Variations in the *local unemployment rate* (HUNEMP) for labor force participants with 12 years of education has some effect on earnings (Table III, Model IIB), but not a strong one. The major impact of higher local unemployment rates was on the employment opportunities of students who wanted to work while they were in school. The evidence suggests that more students worked short hours, and fewer students worked longer hours when unemployment rates in the country increased.[9]

What Have We Learned?

In much of the previous work on the effects of schooling, the emphasis on cognitive scores as the output measure of schools has resulted in fusing the analysis of school effects on students who go on to higher education with their effects on students who go directly into the job market. The extensive literature on the economic returns to schooling has contributed to this emphasis on higher education and to regarding higher education as a simple continuation of the number of years of schooling. Perhaps the most important way by which the disparities in unemployment rates among different groups in the labor force can be reduced, and the most important way productivity can be increased, is by focusing more on those who do not go on to college.

The major results in this paper relevant to this group are the following:

1. There are characteristics of high schools that make a difference to the future earnings of their students who go directly into the labor market. Some of these characteristics are identifiable, but most are not. This means that schools make a difference, but, in most ways, the process is not a uniform one.
2. A particularly interesting result is that a set of school-to-work inputs were identifiably helpful in increasing the earnings of high school graduates. If a student went to a school where up-to-date local job listings were available, acquired information on how to find a job, and worked a substantial number of hours for pay while in school, he or she had significantly and substantially higher earnings. The caveat here, however, is that students who worked a very large number of hours were less likely to graduate on time and had lower grade point averages. The evidence from this data set is that working between 15 and 20 hours each week is optimal. School-to-work interventions have a payoff.
3. The family income and race of the student affect his or her earnings three years after high school, as does getting married at a young age. Both of these, of course, are surrogates for many motivational, stimulating, and expectation components of school and labor market performance. Offsetting negative family environment is on the social agenda, but the evidence, thus far, is that schools have not been able to do so. By now, perhaps the

evidence should be read that they, alone, cannot do so.

4. School test scores and other performance characteristics of a student in school are predictors of the short-term future earnings of the non-college-bound group.

5. Vocational programs are decisively correlated with a lowered earnings potential for students enrolled in those programs. Even for students who went directly into the job market from school, an academic program improved their earnings potential. (We cannot be certain, however, that program impacts are not due to unmeasured differences in student characteristics.)

6. Per-pupil expenditure, class size, teacher salaries, and teacher experience did not affect future student earnings, but some aspects of the school did. Schools that worked at shedding poorer teachers had some tendency to produce students who fared better in jobs, and schools that reward ed principals relatively highly for being managers had students who did better.

7. The state of the local job market (the local unemployment rate) is a force in determining the number of hours students work while in high school. Many more students work 1 to 14 hours per week when the unemployment rate is high, probably because family incomes provide fewer resources to their high school children during these periods. But the students who want to work a substantial number of hours (more than 21 per week) find few opportunities to do so.

Some Policy Implications

On the basis of the existing evidence from the High School and Beyond data set, it is reasonable to conclude that:

- There are school characteristics that help to shape the future job performance of the students who go into the labor market directly, and these are related to school-to-work knowledge.
- Cognitive scores and graduating on time are predictors of success in jobs for these students. It is the skills in mathematics, reading, and vocabulary that are relevant, rather than vocational training.
- Information about the world of work while in high school is important to a student's subsequent performance; working during high school and job market information in the school make major contributions to future earnings.
- Schools that had principals receiving salaries that were relatively high in relation to teacher salaries had students who did better. There is some suggestion that schools with firmer standards for teachers also had students who did better. This suggests the importance of strong school management.

Schools, we conclude, can make a real difference in the job market performance of their graduates who enter the labor market directly. Strong management, although not easily made explicit, is easy to reward, and our results suggest this is important to the job success of their students. Academic skills and real job knowledge are clearly things schools can provide, and they translate into higher earnings.

There are very important factors in the determination of job success, such as family background and the state of the economy, that schools cannot control, or even offset. As the nation allocates public moneys within education, this study suggests that rewarding very competent principals, strengthening academic courses (withdrawing from vocational courses), and developing very available local job information will be productive. As the nation allocates moneys between education and other economic and social policies, there needs to be clear recognition that stronger families and stronger regional economies may be even more important to the final labor market success of high school graduates. Schools have an important role to play, but they cannot, themselves, resolve many of the labor market concerns.

Endnotes

[1] For a full discussion of this issue, see Hanushek, Eric A., et al, Making Schools Work: Improving Performance and Controlling Costs. Washington, DC: The Brookings Institution, 1994.

[2] Two questions combined to distinguished these students from their full-time counterparts: the first question asks during which months the student attended classes between March 1984 and July 1986; the second question asks whether, during the last month in attendance, they were classified as a full-time student. Therefore, those students who were predominantly part-time but finished up as a full-time student, and vice-versa, will be misclassified. Our calculations suggest that this number is very small.

[3] When WKHRS1, WKHRS2, WKHRS3, and WKHRS4 were each regressed against HUNEMP, FAMINC, SWHITE, SASIAN, and HSGPA, the coefficients and t-statistics for HUNEMP were .01 (5.56), .006 (2.15), -.00 (-1.36), and -.02 (-5.38), respectively. These results are discussed in the sections on *pupil extracurricular activity* and *labor market*.

[4] An exception was made for the WORK variables, for which the midpoint between WORK2 and WORK3 was calculated by taking half of each effect.

[5] The regression results of some simple diagnostics were:

Dependent variable:

	GRADOT		HSGPA		FUTEST	
	Coeff	t-stat	Coeff	t-stat	Coeff	t-stat
Intercept	.66	32.75	2.11	61.27	41.03	87.51
WKHRS1	.01	.52	-.03	-.73	1.61	2.50
WKHRS2	-.07	-3.30	-.04	-1.08	1.99	3.99
WKHRS3	-.02	-.88	-.02	-.54	2.70	5.67
WKHRS4	-.23	-12.49	-.16	-5.10	.67	1.59
FAMINC	.00	26.67	0.00	9.39	0.00	13.82
SWHITE	.04	2.22	.27	8.81	4.88	11.50
SASIAN	-.02	-.24	.42	3.32	2.19	1.21
Adj R2		.26		.08		.15
Prob > F		.0001		.0001		.0001

[6] See endnote 3.

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Appendix A: SUMMARY OF RELEVANT STUDIES

STUDY REF # AND AUTHOR	LEVEL OF DATA	SAMPLE: year(s)	#	sex	other	INPUTS: school	pupil	peer
B-1: Benson, et al	Individual	1972 1966 1980	23,000 5,000 58,000	M,F M M,F	HS seniors Ages 14-24 HS sophomores and seniors	curriculum variables	individual characteristics academic performance variables	
B-2: Bishop, et al	Individual	1980; 1982 1972; 1973	28,000 22,652	M,F M,F	HS seniors; then 2 years later HS seniors; then 1 year later No full-time college or active military service in either case	2 school features 2 curriculum variables	6 SES variables 10 academic performance variables 12 individual characteristics 2 employment variables	
B-3 Bishop	Individual	1971	1,774	M	Household heads, ages 25-64		2 academic performance variables 1 individual characteristic	
B-4 Bishop	Individual	1980; 1982	3,000	M,F	HS seniors and 2 years later, no full-time college	2 curriculum variables	6 SES variables 4 individual characteristics	
C-1: Card and Krueger	Individual, with state level aggregations	1979	279,008 299,063 441,675	M M M	White, born between 1920-1929 White, born between 1930-1939 White, born between 1940-1949	3 school quality variables 2 teacher characteristics	1 academic performance variable 7 individual characteristics 1 employment variable	6 peer variables
G-1: Griffin and Alexander	Individual, with some school level aggregations	1955, 1970	338	M	Terminal HS graduates	2 curriculum variables 1 school quality variable school dummy variables	7 SES variables 4 academic performance variables 1 employment variable	1 peer variable
G-2: Gustman and Steinmeier	Individual, with race and gender aggregation	1972 1976	167 2,405	M,F M,F	Black and white, age 21 Black and white, age 22 Terminal HS graduates in both cases	11 curriculum variables	1 SES variable 4 individual characteristics	

LABOR MARKET OUTPUT MEASURE	YRS OUT OF HS	FINDINGS: affect	specific input	population *
Earnings: Annual	1	+	Vocational Education	All Females, Black Females, White Females, All Males, White Males
Earnings: Annual	1	+	Family Income	NLS Males, HSB Males, NLS Females, HSB Females
		+	GPA	NLS Males, HSB Females
		+	Job In HS	NLS Males, HSB Males, HSB Females
		+	School Location: North Central	NLS Males
		+	School Location: Northeast	NLS Females, NLS Males, (HSB Females: New England)
		+	School Location: Pacific Region	HSB Females
		+	School Location: South	NLS Females
		+	School Location: South Atlantic	HSB Females
		+	School Location: West North Central	HSB Females
		+	School Location: West South Central	HSB Females
		+	School Location: Rural	HSB Males, NLS Females
		+	School Location: Suburban	HSB Females, HSB Males
		+	Vocational Courses: More Semesters Of	HSB Males
		-	Academic Courses: # Of Semesters	HSB Females
		-	School Location: East North Central	HSB Males
		-	School Location: New England	HSB Males
		-	School Location: Pacific Region	HSB Males
			School Location: South Atlantic	HSB Males
		-	School Location: Rural	HSB Females
		-	Studying: Hours Spent	NLS Males
Earnings: Hourly	1-3	+	Family Income	HSB Males, NLS Females
		+	GPA	HSB Females
		+	Job In HS	HSB Males, HSB Females
		+	Vocational Courses: More Semesters Of	NLS Females, HSB Males, HSB Females
		-	Academic Courses: # Of Semesters	NLS Females
Employment: # Of Months Unemployed	1	+	Academic Courses: # Of Semesters	HSB Females
		+	Studying: Hours Spent	HSB Males
		-	GPA	NLS Females, HSB Females
		-	Job In HS	NLS Males, NLS Females, HSB Males, HSB Females
		-	Vocational Courses: More Semesters Of	HSB Males, HSB Females
Earnings: Weekly	7-46	+	Ability: Gains In General Intellectual Ability	Male Household Heads
Earnings: Annual	1	+	Vocational Courses (4)	Males, Females
Earnings: Hourly	1	+	Vocational Courses (4)	Males
Worked: % Of Months	1-75	+	Vocational Courses (4)	Females
Earnings: Weekly	21-41	+	Ratio Of Pupils To Teachers: Decrease In	White Males
		+	School Quality	White Males
		+	Teacher Salaries	White Males
		+	Teachers: Better Educated	White Males
Earnings: Annual	12	+	Occupational Attainment	Males
		+	Teacher Contact	Males
		-	College Track	Males
Occupational Attainment	13	+	Academic: Math And Science Coursework	Males
		+	Job Aspirations: White Collar	Males
Earnings: Weekly	3-4	+	Vocational: Business Commercial Courses	White Females
Employed Weeks	2-3	+	Vocational: Business Commercial Courses	White Females (NLS72 only)
		-	Vocational Program: Health Fields	White Males (NLS72 only)

*Certain studies disaggregated their findings according to the survey used. In these cases, the population description indicates this distinction; HSB refers to findings of the High School and Beyond survey; NLS refers to findings of the National Longitudinal Survey of the Class of'72. SES refers to socioconomic status; ADA refers to average daily attendance.

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Appendix A: SUMMARY OF RELEVANT STUDIES

STUDY REF # AND AUTHOR	LEVEL OF DATA	SAMPLE: year(s)	#	sex	other	INPUTS: school	pupil	peer
J-1: Johnson and Stafford	Individual	1965	1,039	M	White, with some income in 1964	state expenditure figures	2 SES variables 4 individual characteristics 1 academic performance variable 1 employment variable	
K-1: Kohen	Individual School	1966 1968	1,321	M	Black and white, ages 18-24 in 1966, out of school 3,030 schools	school quality index district expenditure figures	2 individual characteristics 2 academic performance variables 1 SES variable 1 SES index (5 inputs)	
L-1: Link and Ratledge	Individual	1968	214 945	M M	Black, ages 16-26 White, ages 16-26 Out of school at least 1 year in both cases	district expenditure figures	2 individual characteristics 2 academic performance variables 2 employment variables	
M-1: Meyer and Wise	Individual	1972, 73, 74, 76	22,652	M	HS seniors, then 1-4 years later White and non-white, some enrolled in college	job training in school	3 individual characteristics 6 SES variables 3 academic performance indicators 4 employment variables	2 employment variables
M-2: Morgan and Sirageldin	Individual	1965	1,525	M,F	Household heads with income in 1964	state expenditure figures	4 individual characteristic 1 academic performance variable	1 demographic variable
O-1: O'Neill	Individual	1980, 1987	902 2,055	M M	Black, ages 22-29 in 1987 White, ages 22-29 in 1987 All worked at least 35 hrs/wk	2 school characteristics school quality: individual test scores used as proxy measure	1 individual characteristics 4 academic performance variables 2 SES variables 5 employment variables	2 regional variables
P-1: Parnes and Kohen	Individual, school	1966, 1968	1,500 3,500	M M	Black, ages 14-24 in 1966 White, ages 14-24 in 1966	school quality index (4 inputs) 1 school resource variable	4 individual characteristics 2 academic performance indicators 5 SES variables 2 employment variables	
R-1: Rumberger and Daymont	Individual	1979, 1980	1,857	M,F	Ages 17-21 in 1979 No full-time school enrollment	3 curriculum variables	5 individual variables 1 academic performance indicator 3 SES variables	
W-1: Wachtel	Individual, school	1969	1,812	M	In the Army in 1943, mean age in 1969 was 47 Respondents attended public schools only	district expenditure figures 7 school quality measures	1 individual characteristic 2 academic performance indicators 4 SES variables	1 economic variable
W-2: Welch	State, aggregated from individual and school	1959		M	Rural farm males, at least 25 years old No college attendance	4 school quality variables	2 individual characteristics 1 academic performance indicator 1 SES variable	6 variables

LABOR MARKET OUTPUT MEASURE	YRS OUT OF HS	FINDINGS: effect	specific input	population *
Earnings: Hourly	1-24+	+	Expenditures: State Total Per ADA	White Males Who Are Household Heads
Earnings: Hourly	1-8	+	Education: Years Of Education	Black Males, White Males
Occupational Attainment	1-6	+	Education: Years Of Education	White Males
		-	School Quality	White Males
Earnings: Annual	1-10	+	Ability	Black Males, Whites Males
		+	Education: Years Of Education	Whites Males
		+	Expenditures: District Total Per ADA	Black Males, White Males
Earnings: Hourly	1-4	+	Class Rank	Males
		+	Family Income	Males
		+	Job Training (significant in 5th year only)	Males
		+	Job: Hours Worked While In High School	Males
		+	Test Scores	Males
Employed Weeks	1-4	+	Class Rank	Males
		+	Job: Hours Worked While In High School	Males
		+	Test Scores, But Effect Diminishes Over 4 Years	Males
Earnings: Hourly	1-24+	+	Expenditures: State Total Per ADA	Male And Female Household Heads
Earnings: Hourly	4-11	+	Test Scores	Black Males, White Males
Earnings: Hourly	0-10	+	Occupational Information Test Score	Black Males, White Males
Earnings: Hourly	1-7	+	Vocational And Academic: Amount Of Coursework	Females
		+	Vocational Program Later Used On A Job	Females
Employment: # Of Weeks Unemployed	1-6	+	Vocational And Academic: Amount Of Coursework	Males, Females
		+	Vocational Program	Males, Females
		+	Vocational Program Later Used On A Job	Males, Females
Worked: # Of Hours	1-6	+	Vocational And Academic: Amount Of Coursework	Males, Females
		+	Vocational Program	Males, Females
		+	Vocational Program Later Used On A Job	Males, Females
Earnings: Annual	>= 26	+	% Of HS Graduating Class Who Received PhDs	Males, In The Army In 1943
		+	Average Enrollment Per Building	Males, In The Army In 1943
		+	Expenditures: District Instructional per ADA	Males, In The Army In 1943
		+	Expenditures: District Total Per ADA	Males, In The Army In 1943
		+	Length Of School Year	Males, In The Army In 1943
		+	Percentage Of Teachers With MA Or Phd	Males, In The Army In 1943
		+	Ratio: Ave. Teacher Salary To State Median Income	Males, In The Army In 1943
		+	School Size: Of High School Graduating Class	Males, In The Army In 1943
		+	Teachers: Average Salary	Males, In The Army In 1943
Education: Return To	>= 7	+	Teacher Salaries	Males Who Live On Farms
		-	Ratio Of Teachers To Pupils	Males Who Live On Farms

*Certain studies disaggregated their findings according to the survey used. In these cases, the population description indicates this distinction; HSB refers to findings of the High School and Beyond survey; NLS refers to findings of the National Longitudinal Survey of the Class of'72. SES refers to socioeconomic status; ADA refers to average daily attendance.

Appendix B: SOURCES AND DEFINITIONS OF VARIABLES

All data used in the analysis were taken from the High School and Beyond 1980 Longitudinal Survey of Students in the United States, conducted by the National Opinion Research Center (NORC) on behalf of the National Center for Education Statistics (NCES). All variables pertain to those students who were high school sophomores in 1980. Specifically, the following files were used, referred to in the list of variable definitions according to the Source Code that appears below:

Source Code:	NCES Data File:
A	1980 Sophomore Cohort Student File: Base Year (1980)
B	1980 Sophomore Cohort Student File: First Follow-Up (1982)
C	1980 Sophomore Cohort Student File: Second Follow-Up (1984)
D	1980 Sophomore Cohort Student File: Third Follow-Up (1986)
E	1980 School File
F	1982 School File
G	1984 Administrator and Teacher Survey (Principal Questionnaire)
H	1984 Administrator and Teacher Survey (Teacher Questionnaire)
I	1984 Administrator and Teacher Survey (Guidance Questionnaire)
J	1984 Administrator and Teacher Survey (Vocational Education Coordinator Questionnaire)
K	1982 Local Labor Market Indicators File
L	1982 Sophomore Cohort Transcript Survey
M	1980 U.S. Census *

The lists of both dependent and independent variable definitions on the next several pages provide the following information:

Q # = the actual question number from the survey instrument;
VARIABLE NAME = the variable name that appears in all tables and regression results;
DEFINITION = the information the variable is capturing, and how it has been calculated;
SOURCE = which NCES file was used to gather the data, as coded in the table above;
VARIABLE CATEGORY = the policy-relevant category to which each variable was assigned, as follows:

PCURR = pupil curriculum variable;
PEXT = pupil extracurricular variable;
PPERF = pupil performance variable;
PSES = pupil socioeconomic characteristic;
SCHSTU = school student body characteristic;
SEXP = expenditure variable;
SINST = school instructional variable;
SSTAF = school staff variable.
UN = local unemployment rate.

* These data were generously provided by Dr. Steven Rivkin, Amherst College.

Appendix C: MEANS AND STANDARD DEVIATIONS FOR VARIABLES USED IN REGRESSIONS

Variable	*Name*	*Mean*	*Standard dev.*	*N*
Earnings in 1985	EARN85	8789.99	6717.12	1055
% of students in academics	ACPROG12	48.45	28.39	1055
Has a 2- or 3-year postsec. deg.	ASSOC2	0.60	0.24	1055
Presence of children	CHILD	0.10	0.11	1055
Average class size	CLASSIZE	23.75	4.36	1055
% 10th grade dropouts	DROPOUTS	8.00	7.93	1055
Family composition	FAMCOMP	0.81	0.39	1055
Family income	FAMINC	24637.13	17279.43	1055
Know how to find job	FINDJOB	0.84	0.37	1055
Senior test	FUTEST	50.86	8.05	1017
Grad. HS on time	GRADOT	0.96	0.18	1046
HS grade point average	HSGPA	2.56	0.60	1052
County unempl. rate	HUNEMP	6.57	2.46	1055
>5 hrs. homework, Sr.	HW82F	0.24	0.42	1055
No. of in-school extracurricular	INSCHACT	2.05	1.92	1055
Attended kindergarten	KINDGTN	0.88	0.32	1055
Local employers' job listings	LOCALJOB	0.78	0.41	1055
Marital status	MARRIED	0.14	0.35	1055
Family income missing	MFAMINC	0.80	0.28	1055
No. of out-of-school activities	OUTSCHAC	0.48	0.50	1055
Worked for pay	PAYWK82	0.80	0.40	1055
Has vocational prog.	PROGVOC	0.22	0.41	1055
Prin. / teacher salary	PSALARY	3.42	1.27	1055
Pupil is Asian	SASIAN	0.10	0.90	1055
Activities offered	SCHACTV	25.50	9.79	1055
Off-campus work	SCHPROGC	0.85	0.36	1055
School size	SCHSIZE	1060.29	681.24	1055
Private nonreligious school	SCHTYPEO	0.10	0.11	1055
Private religious school	SCHTYPER	0.11	0.32	1055
Sex	SSEX	0.46	0.50	1055
% Black students	STBLACK	13.23	21.55	1055
Pupil is White	SWHITE	0.88	0.33	1055
Teacher absent	TABSENT	3.74	2.76	1055
Teacher dismissed	TDISMISS	0.98	1.69	1055
Teacher salary	TSALARY	10518.36	1511.32	1055
Worked for pay 1-4 hrs/week	WKHRS1	0.90	0.29	1055
Worked for pay 5-14 hrs/week	WKHRS2	0.17	0.38	1055
Worked for pay 15-21 hrs/week	WKHRS3	0.23	0.42	1055
Worked for pay > 21 hrs/week	WKHRS4	0.28	0.45	1055
No. of yrs. teaching	YRSTCHT	10.38	1.43	1055

Appendix D: MODEL I (INCLUDING PERFORMANCE MEASURES)

	Model IC *	Model ID **	Model IE ***
N	1958	1966	1877
Model F-test	2.28	2.31	2.24
Probability	0.1000	0.1000	0.1000
Adjusted R-squared	0.18	0.18	0.18
F-test of school dum	1.29	1.33	1.26
Probability	0.1300	0.4000	0.3400

* Results include a measure of whether the student graduated on time (GRADOT).

** Results include a measure of high school academic performance (HSGPA).

*** Results include a measure of performance on standardized tests (FUTEST).

Appendix E: MODEL II (INCLUDING PERFORMANCE MEASURES)

Variable Name	MODEL II C Coefficient	t-stat		MODEL II D Coefficient	t-stat		MODEL II E Coefficient	t-stat	
ASSOC2	1311.17	1.62		1324.67	1.63		1076.72	1.32	
CHILD	1516.25	0.92		1847.65	1.11		2652.89	1.49	
FAMCOMP	-258.80	-0.52		-397.97	-0.80		-381.72	-0.75	
FAMINC	0.30	2.05	**	0.20	1.95	*	0.20	1.63	
FINDJOB	845.33	1.72	*	939.55	1.90	*	739.69	1.49	
FUTEST	NA	NA		NA	NA		62.01	2.45	**
GRADOT	2243.80	2.22	**	NA	NA		NA	NA	
HSGPA	NA	NA		783.35	2.33	**	NA	NA	
HW82F	331.33	0.75		191.42	0.43		171.49	0.38	
INSCHACT	71.29	0.67		43.84	0.41		90.84	0.83	
KINDGTN	446.60	0.77		444.13	0.76		361.67	0.61	
MARRIED	-1043.07	-1.87		*	-1103.69		-1.98	**	-935.50
-1.65	*								
MFAMINC	-1595.55	-2.13	**	-1383.62	-1.84	*	-1442.23	-1.90	*
OUTSCHAC	-159.81	-0.40		-167.23	-0.42		-130.68	-0.32	
PROGVOC	-779.15	-1.69	*	-798.91	-1.73	*	-744.81	-1.56	
SASIAN	3868.11	2.02	**	3448.12	1.80	*	4020.30	2.02	**
SSEX	3670.99	9.29	***	3701.45	9.28	***	3495.38	8.62	***
SWHITE	1899.74	2.99	***	1901.66	2.97	***	1780.27	2.74	***
WKHRS1	-174.71	-0.24		178.00	0.24		-30.47	-0.40	
WKHRS2	461.43	0.75		628.83	1.02		534.05	0.86	
WKHRS3	2263.04	3.92	***	2313.06	4.01	***	2255.98	3.84	***
WKHRS4	1996.93	3.65	***	2087.13	3.81	***	2031.26	3.65	***
ACPROG12	-8.47	-1.06	-8.26	-1.04	-5.21	-0.64			
CLASSIZE	48.07	0.93		52.52	1.01		39.75	0.76	
DROPOUTS	-25.91	-0.98		-30.17	-1.15		-21.40	-0.79	
LOCALJOB	817.71	1.75	*	716.97	1.53		575.78	1.21	
PSALARY	268.05	1.29		292.63	1.42		282.98	1.35	
SCHACTV	-29.68	-1.39		-29.27	-1.37		-28.01	-1.30	
SCHPROGC	199.97	0.31		231.12	0.36		47.75	0.70	
SCHSIZE	-0.39	-1.07		-0.36	-0.98		-0.28	-0.76	
SCHTYPEO	371.66	0.20		574.32	0.31		278.28	0.15	
SCHTYPER	-1299.18	-1.59		-1331.10	-1.63		-1527.92	-1.82	**
STBLACK	-11.09	-1.25		-11.37	-1.27		-12.78	-1.39	
TABSENT	-53.66	-0.72		-68.28	-0.92		-67.58	-0.89	
TDISMISS	163.11	1.43		159.02	1.40		124.52	1.10	
TSALARY	0.90	0.63		0.90	0.63		0.10	0.66	
YRSTCHT	109.81	0.72		101.12	0.66		131.37	0.85	
HUNEMP	-87.84	-1.08		-85.25	-1.05		-80.35	-0.96	
N	1134			1141			1100		
Model_F	6.77			6.59			6.49		
M_Prob>F	0.1000			0.1000			0.1000		
Adj R_sq	0.15			0.15			0.15		
School_F	1.23			1.22			1.04		
S_Prob>F	0.24			0.25			0.4091		

* Statistically significant at the 10% level; ** at the 5% level; *** at the 1% level.

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